

- Demand is the relationship between price and the amount that consumers are willing and able to purchase at various prices in a given period of time. The law of demand states that consumers buy more at lower prices and less at higher prices, all other things equal.
- There is a difference between a change in demand and a change in quantity demanded. A change in quantity demanded can be caused only by a change in the price of the good. It is a movement along the demand curve. At a lower price, a greater quantity is demanded.
- A change in demand means that more or less is demanded at every price; it is caused by changes in preferences, incomes, expectations, population and the prices of complementary or substitute goods.
- The income effect, the substitution effect and the law of diminishing marginal utility can explain why a demand curve is downward sloping.
- The law of diminishing marginal utility states that as more of a good or service is consumed in a given period of time, the additional benefit or satisfaction declines.
- Supply is the relationship between price and the amount that producers are willing and able to sell at various prices in a given period of time. Producers are willing to sell more at higher prices and less at lower prices, all other things equal.
- There is a difference between a change in supply and a change in quantity supplied. A change in quantity supplied can be caused only by a change in the price of a good. It is a movement along the curve. A change in supply is a shift of the curve where more or less is supplied at every price. Changes in technology, production costs, taxes, subsidies and expectations will cause a shift in supply.
- In competitive markets, supply and demand constitute the sum of many individual decisions to sell and to buy. The interaction of supply and demand determines the price and quantity that will clear the market. The price where quantity supplied and quantity demanded are equal is called the equilibrium or market-clearing price.
- At a price higher than equilibrium, there is a surplus and pressure on sellers to lower their prices. At a price lower than equilibrium, there is a shortage and pressure on buyers to offer higher prices.
- An administered maximum price is called a price ceiling. A price ceiling below the equilibrium price causes shortages. A price ceiling set at or above the equilibrium price has no effect on the market.
- An administered minimum price is called a price floor. A price floor above the equilibrium price causes surpluses. A price floor set at or below the equilibrium price has no effect on the market.
- Market prices promote economic progress because at the equilibrium price there is both consumer and producer surplus. In other words, buyers and sellers are both better off at the equilibrium price.
- Consumer surplus is the difference between what consumers are willing to pay for a good or service and the price that consumers actually have to pay.
- Producer surplus is the difference between the price businesses would be willing to accept for the goods and services and the price they actually receive.
- Price elasticity of demand refers to how much the quantity demanded changes in relation to a given change in price. If the percentage change in quantity demanded is greater than the percentage change in price, the demand for the good is considered elas-

tic. If the percentage change in quantity demanded is less than the percentage change in price, the demand for the good is considered inelastic. If the percentage change in price is equal to the percentage change in quantity demanded, the demand for the good is considered unit elastic.

- Luxuries have a more-elastic demand than necessities because luxury goods use a greater percentage of income. High-priced goods have a more elastic demand than low-priced goods. Goods that are habit-forming tend to have an inelastic demand. Demand is more elastic in the long run than in the short run.

- Price elasticity of demand can be determined by using the total revenue and arc methods.
- Price elasticity of supply, also stated in percentage terms, refers to how much quantity supplied changes in relation to a given change in price. Supply is more elastic in the long run than in the short run.
- In a market economy, prices provide information, allocate resources and act as rationing devices. It is important to know how to illustrate a wide range of situations with supply and demand graphs.

Demand Curves, Movements Along Demand Curves and Shifts in Demand Curves

Part A

Figure 9.1 shows the market demand for a hypothetical product: Greebes. Study the data, and plot the demand for Greebes on the axes in Figure 9.2. Label the demand curve D, and answer the questions that follow. Write the correct answer in the answer blanks or underline the correct words in parentheses.

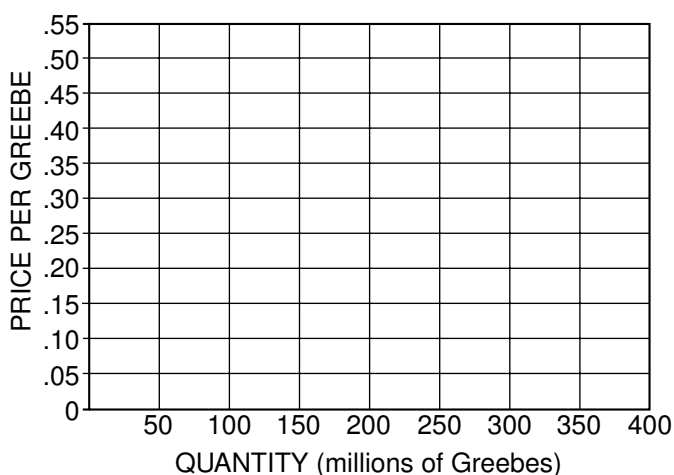


Figure 9.1
Demand for Greebes

Price (\$ per Greebe)	Quantity Demanded (millions of Greebes)
\$.10	350
.15	300
.20	250
.25	200
.30	150
.35	100
.40	50



Figure 9.2
Demand for Greebes



The data for demand curve D indicate that at a price of \$0.30 per Greebe, buyers would be willing to buy _____ million Greebes. Other things constant, if the price of Greebes increased to \$0.40 per Greebe, buyers would be willing to buy _____ million Greebes. Such a change would be a decrease in (*demand / quantity demanded*). Other things constant, if the price of Greebes decreased to \$0.20, buyers would be willing to buy _____ million Greebes. Such a change would be called an increase in (*demand / quantity demanded*).

Adapted from Phillip Saunders, *Introduction to Microeconomics: Student Workbook*, 18th ed. (Bloomington, Ind., 1998). Copyright © 1998 Phillip Saunders. All rights reserved.

Now, let's suppose there is a dramatic change in federal income-tax rates that affects the disposable income of Greebe buyers. This change in the *ceteris paribus* (all else being equal) conditions underlying the original demand for Greebes will result in a new set of data, shown in Figure 9.3. Study these new data, and add the new demand curve for Greebes to the axes in Figure 9.2. Label the new demand curve D_1 and answer the questions that follow.



Figure 9.3

New Demand for Greebes

Price (\$ per Greebe)	Quantity Demanded (millions of Greebes)
\$.05	300
.10	250
.15	200
.20	150
.25	100
.30	50

Comparing the new demand curve (D_1) with the original demand curve (D), we can say that the change in the demand for Greebes results in a shift of the demand curve to the (*left / right*).

Such a shift indicates that at each of the possible prices shown, buyers are now willing to buy a (*smaller / larger*) quantity; and at each of the possible quantities shown, buyers are willing to offer a (*higher / lower*) maximum price. The cause of this demand curve shift was a(n) (*increase / decrease*) in tax rates that (*increased / decreased*) the disposable income of Greebe buyers.

Now, let's suppose that there is a dramatic change in people's tastes and preferences for Greebes. This change in the *ceteris paribus* conditions underlying the original demand for Greebes will result in a new set of data, shown in Figure 9.4. Study these new data, and add the new demand curve for Greebes to the axes in Figure 9.2. Label the new demand curve D_2 and answer the questions that follow.



Figure 9.4

New Demand for Greebes

Price (\$ per Greebe)	Quantity Demanded (millions of Greebes)
\$.20	350
.25	300
.30	250
.35	200
.40	150
.45	100
.50	50

Comparing the new demand curve (D_2) with the original demand curve (D), we can say that the change in the demand for Greebes results in a shift of the demand curve to the (*left / right*).

Such a shift indicates that at each of the possible prices shown, buyers are now willing to buy a (*smaller / larger*) quantity; and at each of the possible quantities shown, buyers are willing to offer a (*lower / higher*) maximum price. The cause of this shift in the demand curve was a(n) (*increase / decrease*) in people's tastes and preferences for Greebes.

Part B

Now, to test your understanding, underline the answer you think is the one best alternative in each of the following multiple-choice questions.

1. Other things constant, which of the following would *not* cause a change in the demand (shift in the demand curve) for mopeds?
 - (A) A decrease in consumer incomes
 - (B) A decrease in the price of mopeds
 - (C) An increase in the price of bicycles
 - (D) An increase in people's tastes and preferences for mopeds
2. "Rising oil prices have caused a sharp decrease in the demand for oil." Speaking precisely, and using terms as they are defined by economists, choose the statement that best describes this quotation.
 - (A) The quotation is correct: An increase in price always causes a decrease in *demand*.
 - (B) The quotation is incorrect: An increase in price always causes an increase in *demand*, not a decrease in *demand*.
 - (C) The quotation is incorrect: An increase in price causes a decrease in the *quantity demanded*, not a decrease in *demand*.
 - (D) The quotation is incorrect: An increase in price causes an increase in the *quantity demanded*, not a decrease in *demand*.
3. "As the price of domestic automobiles has inched upward, customers have found foreign autos to be a better bargain. Consequently, domestic auto sales have been decreasing, and foreign auto sales have been increasing." Using only the information in this quotation and assuming everything else constant, which of the following best describes this statement?
 - (A) A shift in the demand curves for both domestic and foreign automobiles
 - (B) A movement along the demand curves for both foreign and domestic automobiles
 - (C) A movement along the demand curve for domestic autos, and a shift in the demand curve for foreign autos
 - (D) A shift in the demand curve for domestic autos, and a movement along the demand curve for foreign autos

4. You hear a fellow student say: “Economic markets are like a perpetual see-saw. If demand rises, the price rises; if price rises, then demand will fall. If demand falls, price will fall; if price falls, demand will rise and so on forever.” Dispel your friend’s obvious confusion in no more than one short paragraph below.

Part C

Once we have the demand curve, we can define the concept of *consumer surplus*. Consumer surplus is the value received from the purchase of a good in excess of the price paid for it, or stated differently, the difference between the amount a person is willing and able to pay and the actual price paid for each unit.

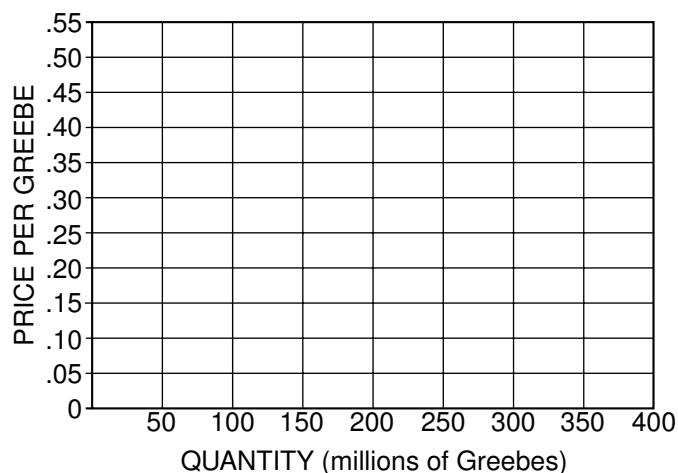
An approximation of consumer surplus can be shown graphically as the area below the demand curve above the price paid. Redraw the first demand curve (D) from Figure 9.2 on Figure 9.5.

If the price for all the quantities sold is established at \$0.30, shade the area above \$0.30 up to the demand curve. This is the area of consumer surplus.

Continue to use the demand curve from Figure 9.2, and assume that the price is established at \$0.30. There are buyers who will benefit because they are willing and able to pay higher prices than the established price (\$0.30). For example, 50 million Greebes are demanded at \$0.40, but since the market price is \$0.30, there is a gain to the buyers represented by this 50 million. The gain is a total of \$5 million ($\$0.10 \times 50 \text{ million} = \5 million). The buyers of the next 50 million Greebes (always consider the extra or marginal buyers since the buyers at the higher prices will also be willing to buy at the lower price) are willing to pay \$0.35, providing a gain of \$0.05 of the consumer surplus, for a total of \$2.5 million.



Figure 9.5
Consumer Surplus



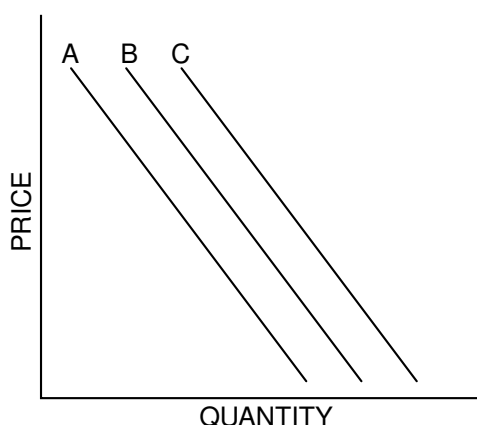
- Approximately what will be the total consumer surplus for the buyers of the 150 million Greebes at a price of \$0.30? _____
- If the price consumers pay increases, the shaded area (*increases / decreases*). If the price consumers pay decreases, the shaded area (*increases / decreases*).
- If the equilibrium price drops to \$0.20, what will happen to consumer surplus? (*Increase / Decrease*)
- At \$0.20, calculate the consumer surplus for buyers willing to pay
 - \$0.40 _____
 - \$0.35 _____
 - \$0.30 _____
 - \$0.25 _____
 - What is the total surplus? _____
- Will there be any consumer surplus at a price of \$0.20 for the buyers willing and able to spend \$0.20, \$0.15 or \$0.10? Why or why not?

Reasons for Changes in Demand

Part A

Read the eight newspaper headlines in Figure 10.2, and use the table to record the impact, if any, of each event on the demand for beef. Use the first column to the right of the headline to show whether the event causes a change in demand. Use the next column to record whether the change is an increase or a decrease in demand. In the third column, decide whether the demand curve shifts left or right. Finally, write the letter for the new demand curve. Use Figure 10.1 to help you. **Always start at curve B**, and move only one curve at a time. One headline implies that the demand for beef does not change.

✱ Figure 10.1
Beef Consumption in May



✱ Figure 10.2

Headline	Demand Shift? (Y/N)	If Demand Shifts, Inc/Dec?	Curve Shifts Left/Right?	New Curve
1. Price of Beef to Rise in June				
2. Millions of Immigrants Swell U.S. Population				
3. Pork Prices Drop				
4. Surgeon General Warns That Eating Beef Is Hazardous to Health				
5. Beef Prices Fall; Consumers Buy More				
6. Real Income for U.S. Drops for Third Month				
7. Charcoal Shortage Threatens Memorial Day Cookouts				
8. Nationwide Fad: The Disco-Burger				

Based on an activity from *Master Curriculum Guide in Economics: Teaching Strategies for High School Economics Courses* (New York: National Council on Economic Education, 1985), p. 68.

Part B

Categorize each change in demand in Part A according to the reason why demand changed. A given demand curve assumes that consumer expectations, consumer tastes, the number of consumers in the market, the income of consumers, and the prices of substitutes and complements are unchanged. In the table below, place an X next to the reason that the event described in the headline caused a change in demand. One headline will have no answer because it is a change in quantity demanded.

Figure 10.3

↓ Reason	Headline Number →							
	1	2	3	4	5	6	7	8
A change in consumer expectations								
A change in consumer tastes								
A change in the number of consumers in the market								
A change in income								
A change in the price of a substitute good								
A change in the price of a complementary good								

Why Is a Demand Curve Downward Sloping?

To most people, the law of demand is obvious: Consumers buy more at a lower price and less at a higher price. Economics goes beyond describing the combined demand of all consumers in a market. To explain why a demand curve is downward sloping, or negatively sloped, economists focus on the demand curve of a single consumer.

The total utility of a quantity of goods and services to a consumer can be represented by the maximum amount of money he or she is willing to give in exchange for them. The marginal utility of a good or service to a consumer (measured in money terms) is the maximum amount of money he or she is willing to pay for one more unit of the good or service. With these definitions, we can now state a simple idea about consumer tastes: The more of a good a consumer has, the less will be the marginal utility of an additional unit.

Part A

Figure 11.1 presents data on Dolores' evaluation of different quantities of polo shirts and different quantities of steak.

1. Use the data to compute the marginal utility of each polo shirt and each steak. The numbers in the figure represent the amount of dollars Dolores is willing to pay for the polo shirts and steaks.



Figure 11.1
Marginal Utility of Polo Shirts and Steaks

Number of Polo Shirts	Total Utility	Marginal Utility	Number of Steaks	Total Utility	Marginal Utility
0	0		0	0	
1	60	60	1	20	20
2	100	40	2	36	16
3	130		3	51	
4	150		4	65	
5	165		5	78	
6	175		6	90	

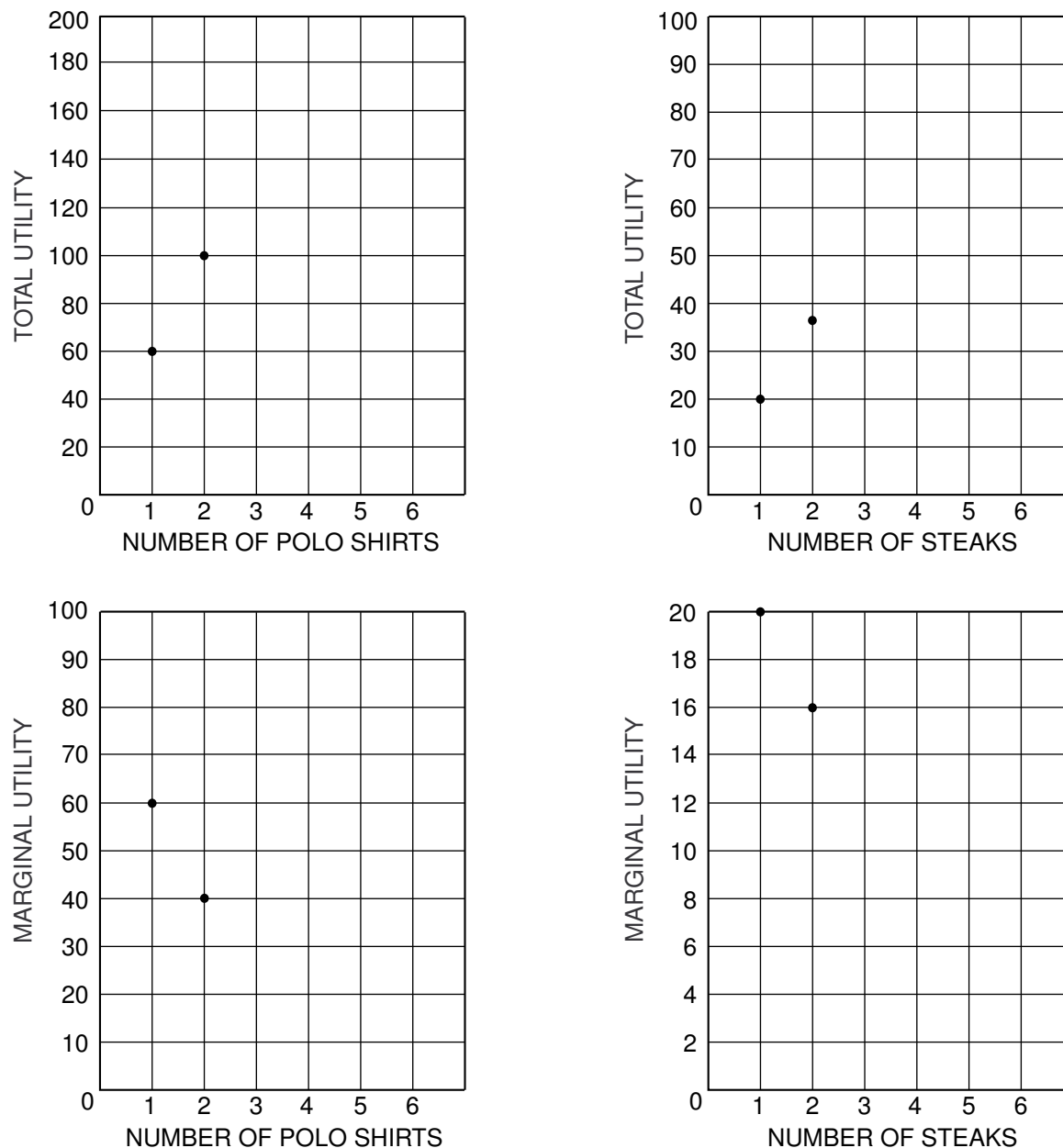
2. Using Figure 11.2 (on the next page), plot Dolores' total utility and marginal utility for polo shirts and steaks. Each graph has two points to get you started.

Adapted from Craig Swan, *Study Guide for Baumol and Blinder Economics: Principles and Policy*, 6th ed. (Fort Worth: Harcourt Brace & Co., 1994), pp. 100 to 102.



Figure 11.2

Total and Marginal Utility of Polo Shirts and Steaks



3. Looking at the chart and graphs, you can conclude:

(A) Total utility is always (*increasing* / *decreasing*).

(B) Marginal utility initially (*increases* / *decreases*) and eventually (*increases* / *decreases*).

You have demonstrated the law of *diminishing marginal utility*.

Part B

If Dolores has a given budget and must choose between polo shirts and steaks, she will make her choice so that the marginal utility per dollar spent of each good is the same. Using the data in Figure 11.1 and assuming that the price of both goods is \$30, let's see what happens if Dolores spends her entire budget of \$150 dollars and buys five polo shirts and no steaks. Her marginal utility from the last polo shirt is 15 and from the first steak is 20. So if she buys only four polo shirts and one steak, she loses a utility of 15 on the polo shirt but gains utility of 20 on the steak. Dolores is better off.


Suppose Dolores spends her \$150 and buys four polo shirts and one steak. Her marginal utility on the last polo shirt is 20 and on the steak is also 20. She will not want to switch. To buy the next steak gives her an increase in utility of 16, but she would have to give up a polo shirt, which would reduce her utility by 20. Conversely, to buy an additional polo shirt would increase her utility by 15, but she would lose 20 from giving up the steak. Dolores should not change her purchases.

If the prices of the two goods differ, then Dolores will adjust her consumption until the marginal utilities of the two goods, *per dollar spent*, are equal. Or, stated in another way,

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y}$$

4. Use the information in Figure 11.3 to analyze Frank's choice between gasoline and food.

Frank has an income of \$130, the price of gasoline is \$10 per gallon and the price of food is \$20. Complete the table.

 Figure 11.3

Gasoline	MU_g	MU_g / P_g	Food	MU_f	MU_f / P_f
1	60	6.0	1	115	5.75
2	55		2	105	
3	51		3	98	
4	48		4	94	
5	47		5	92	
6	46		6	90	

- (A) Does the combination $G = 1$ and $F = 6$ satisfy the income constraint? _____

Can Frank purchase this combination of goods with his income? _____

- (B) Is this the utility maximizing combination of goods? _____

- (C) In which direction would Frank like to reallocate his purchases?

- (D) What is Frank's utility maximizing combination of goods, subject to the income constraint of \$130?

Part C

Assume you go into a store to buy a bottle of water. The bottle of water costs you \$1. You would have been willing to pay \$2. The difference between what you paid and what you would have been willing to pay is *consumer surplus*.

We can calculate Dolores' consumer surplus from buying steak by looking at her demand curve. Look at her marginal utility curve for steak: At three steaks, Dolores is willing to pay \$15 for one more; at four steaks, she is willing to pay \$14. Dolores will buy steak until the point where the price is equal to the marginal utility of the last steak. Dolores will pay the same price for each of the steaks she buys. Thus, if the price of steak is \$14, she will buy four steaks; the marginal utility of the fourth steak is \$14. Dolores would have been willing to pay more for the earlier steaks. She has gotten a bargain buying four steaks at \$14 apiece for a total of \$56. She would have been willing to pay \$20 for the first, \$16 for the second, \$15 for the third, and \$14 for the fourth, for a total of \$65. The consumer surplus is the difference between what she was willing to pay (\$65) and what she paid (\$56). Her consumer surplus is \$9.

Consider the following information on Joel's total utility for CD purchases, and then underline the correct answer for each question that follows.

 Figure 11.4
Total Utility of CDs

Number of CDs	Total Utility
1	\$ 25
2	\$ 45
3	\$ 63
4	\$ 78
5	\$ 90
6	\$100
7	\$106
8	\$110

5. What marginal utility is associated with the purchase of the third CD?
(A) \$18 (B) \$21 (C) \$45 (D) \$63
6. What is Joel's consumer surplus if he purchases three CDs at \$11 apiece?
(A) \$30 (B) \$33 (C) \$63 (D) \$96
7. What would happen to Joel's consumer surplus if he purchased an additional CD at \$11?
(A) Consumer surplus declines by \$11.
(B) Consumer surplus increases by \$11.
(C) Consumer surplus increases by \$15.
(D) Consumer surplus increases by \$4.
8. How many CDs should Joel buy when they cost \$11 apiece?
(A) 0 (B) 3 (C) 5 (D) 7

9. What is Joel's consumer surplus at the optimal number of CD purchases?
(A) \$35 (B) \$55 (C) \$79 (D) \$100
10. If CDs go on sale and their price drops to \$8, how many CDs do you expect Joel to buy?
(A) 5 (B) 6 (C) 7 (D) 8
11. Why is consumer surplus important?

Part D

Income and Substitution Effects

Another way of explaining the downward sloping demand curve is through the *income* and *substitution effects*.

Income effect: When the price of a good falls, consumers experience an increase in purchasing power. When the price of a good increases, consumers experience a decrease in purchasing power.

Substitution effect: When the price of a good changes, consumers will substitute toward the now relatively less-expensive good.

You go to your favorite burger place. The price of a burger has increased, but the price of the chicken sandwich stays the same. Over the course of a week, you generally buy both burgers and chicken sandwiches.

12. How will the increase in the price of a burger affect the purchase of burgers? Explain.
13. Describe how the substitution effect changes your purchases.
14. Describe how the income effect changes your purchases.

Supply Curves, Movements Along Supply Curves and Shifts in Supply Curves

In this activity and those that follow, we will assume that the long-run supply curve of Greebes is typically upward sloping.

Part A

Study the data in Figure 12.1 and plot the supply of Greebes on the axes in Figure 12.2. Label the supply curve S and answer the questions that follow. Write the correct answer on the answer blank, or underline the correct answer in parentheses.



Figure 12.1

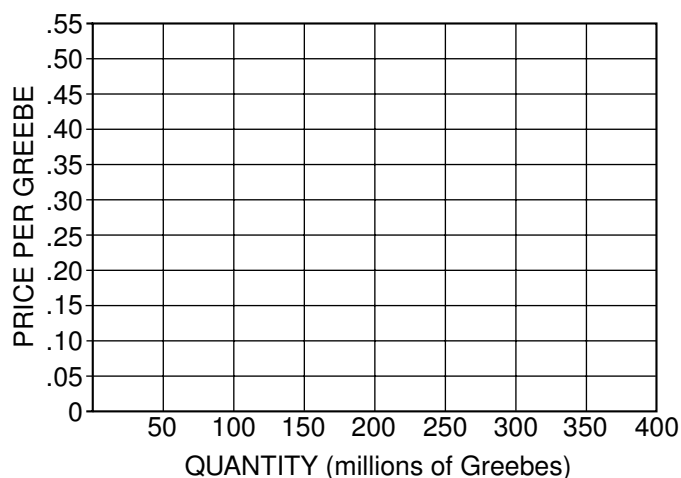
Supply of Greebes

Price (\$ per Greebe)	Quantity Supplied (millions of Greebes)
\$.15	100
.20	150
.25	200
.30	250
.35	300



Figure 12.2

Supply of Greebes



The data for supply curve S indicate that at a price of \$0.25 per Greebe, suppliers would be willing to offer _____ million Greebes. Other things constant, if the price of Greebes increased to \$0.30 per Greebe, suppliers would be willing to offer _____ million Greebes. Such a change would be an increase in (*supply / quantity supplied*).

Adapted from Phillip Saunders, *Introduction to Microeconomics: Student Workbook*, 18th ed. (Bloomington, Ind., 1998). Copyright © 1998 Phillip Saunders. All rights reserved.

Other things constant, if the price of Greebes decreased to \$0.20 per Greebe, suppliers would be willing to offer _____ million Greebes. Such a change would be called a decrease in (*supply / quantity supplied*).

Now, let's suppose that there is a dramatic change in the price of several of the raw materials used in making Greebes. This change in the *ceteris paribus* conditions underlying the original supply of Greebes will result in a new set of data, such as that shown in Figure 12.3. Study the data, and plot this supply of Greebes on the axes in Figure 12.2. Label the new supply curve S_1 and answer the questions that follow.

✱ Figure 12.3
New Supply of Greebes

Price (\$ per Greebe)	Quantity Supplied (millions of Greebes)
\$.20	50
.25	100
.30	150
.35	200
.40	250

Comparing the new supply curve (S_1) with the original supply curve (S), we can say that a change in the supply of Greebes results in a shift of the supply curve to the (*left / right*). Such a shift indicates that at each of the possible prices shown, suppliers are now willing to offer a (*smaller / larger*) quantity; and at each of the possible quantities shown, suppliers are willing to accept a (*higher / lower*) minimum price. The cause of this supply curve shift was a(n) (*increase / decrease*) in prices of several of the raw materials used in making Greebes.

Now, let's suppose that there is a dramatic change in the price of Silopanna, a resource used in the production of Greebes. This change in the *ceteris paribus* conditions underlying the original supply of Greebes will result in a new set of data shown in Figure 12.4. Study the data, and plot this supply of Greebes on the axes in Figure 12.2. Label the new supply curve S_2 and answer the questions that follow.

✱ Figure 12.4
New Supply of Greebes

Price (\$ per Greebe)	Quantity Supplied (millions of Greebes)
\$.10	150
.15	200
.20	250
.25	300
.30	350

Comparing the new supply curve (S_2) with the original supply curve (S), we can say that the change in the supply of Greebes results in a shift of the supply curve to the (*left / right*). Such a shift indicates that at each of the possible prices shown, suppliers are now willing to offer a (*smaller / larger*) quantity;

and at each of the possible quantities shown, suppliers are willing to accept a (*lower / higher*) minimum price. The cause of this supply curve shift is a(n) (*increase / decrease*) in the price of Silopanna, a resource used in the production of Greebes.

Part B

Now, to check your understanding, underline the answer you think is the one best alternative in each of the following multiple-choice questions.

1. Other things constant, which of the following would *not* cause a change in the long-run supply of beef?
 - (A) A decrease in the price of beef
 - (B) A decrease in the price of cattle feed
 - (C) An increase in the price of cattle feed
 - (D) An increase in the cost of transporting cattle to market
2. “Falling oil prices have caused a sharp decrease in the supply of oil.” Speaking precisely, and using terms as they are defined by economists, choose the statement that best describes this quotation.
 - (A) The quotation is correct: A decrease in price always causes a decrease in *supply*.
 - (B) The quotation is incorrect: A decrease in price always causes an increase in *supply*, not a decrease in *supply*.
 - (C) The quotation is incorrect: A decrease in price causes an increase in the *quantity supplied*, not a decrease in *supply*.
 - (D) The quotation is incorrect: A decrease in price causes a decrease in the *quantity supplied*, not a decrease in *supply*.
3. You overhear a fellow student say: “Economic markets are like a slide: If supply increases, the price increases; if the price increases, then supply will fall. If supply falls, the price will rise; if the price increases, supply will increase and so on forever.” Dispel your friend’s obvious confusion (in no more than one short paragraph) below.

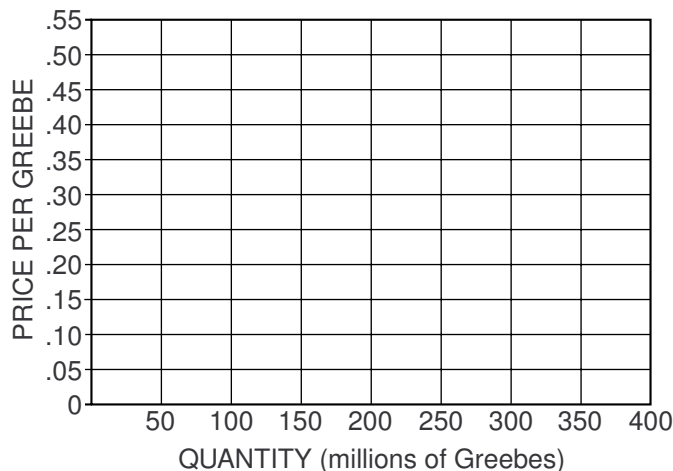
Part C

Once we have the supply curve, we can define the concept of *producer surplus*. Producer surplus is the amount a seller is paid minus the seller’s cost. An approximation of producer surplus can be shown graphically as the area below the equilibrium price and above the supply curve.

4. Redraw the first supply curve (S) from Figure 12.2 on Figure 12.5. If the price for all the quantities sold is established at \$0.30, shade the area below \$0.30 down to the supply curve. This is the area of producer surplus.



Figure 12.5
Producer Surplus



5. Underline the correct answer in parentheses for these questions and for similar questions below.
 - (A) If the equilibrium price increases, the shaded area (*increases / decreases*).
 - (B) If the equilibrium price decreases, the shaded area (*increases / decreases*).

6. Continue to use the supply curve from Figure 12.2 and assume that the selling price is established at \$0.25. There are producers who will benefit because some are willing to offer Greebes for a price lower than the established price (\$0.25). For example, 100 million Greebes are supplied at \$0.15, but since the market price is \$0.25, producer surplus for the first 100 million will be \$10 million: $(\$0.25 - \$0.15) \times 100$. Sellers of the next 50 million Greebes (always consider the extra or marginal sellers since the sellers at the lower prices will also be willing to sell at the higher price) are willing to sell Greebes for \$0.20, providing a gain of \$0.05 for each, resulting in a producer surplus of \$2.5 million.
 - (A) Approximately what will be the total producer surplus for the sellers if the price is \$0.25?

 - (B) If a seller's price were to increase to \$0.30, what will happen to producer surplus?
(*Increase / Decrease*)
 - (C) Calculate the producer surplus for sellers willing to offer

\$0.15	_____
\$0.20	_____
\$0.25	_____
\$0.30	_____

 What is the total surplus? _____

Reasons for Changes in Supply

Part A

Read the eight newspaper headlines in Figure 13.2, and record the impact, if any, of each event on the supply of cars. Use the first column to the right of the headline to show whether the event will cause a change in supply. Use the next column to record whether the change is an increase or a decrease in supply. In the third column, decide whether the supply curve shifts left or right. Finally, write the letter for the new supply curve. Use Figure 13.1 to help you. **Always start at curve B**, and move only one curve at a time. Two headlines imply that the supply of cars does not change.



Figure 13.1
Supply of Foreign and Domestic Cars

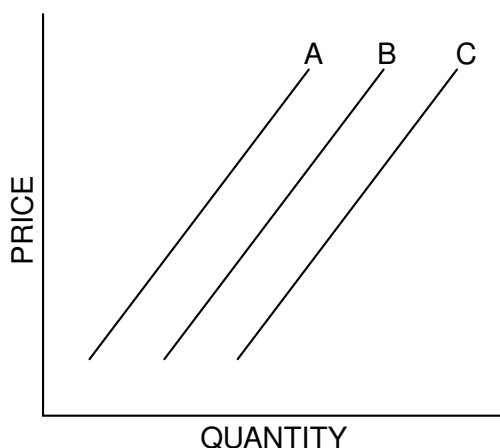



Figure 13.2

Headline	Supply Shift? (Y/N)	If Supply Shifts, Inc/Dec?	Curve Shifts Left/Right?	New Curve
1. Auto Workers' Union Agrees to Wage Cuts				
2. New Robot Technology Increases Efficiency				
3. Nationwide Auto Strike Began at Midnight				
4. New Import Quotas Reduce Foreign Car Imports				
5. Cost of Steel Rises				
6. Auto Producer Goes Bankrupt; Closes Operation				
7. Buyers Reject New Models				
8. National Income Rises 2%				

From *Master Curriculum Guide in Economics: Teaching Strategies for High School Economics Courses* (New York: National Council on Economic Education, 1985), p. 69

Part B

Categorize each change in supply in Part A according to the reason why supply changed. In Figure 13.3, place an X next to the reason that the headline indicated a change in supply. In some cases, more than one headline could be matched to a reason. Two headlines do not indicate a shift in supply.

 Figure 13.3

↓ Reason	Headline Number →							
	1	2	3	4	5	6	7	8
A change in costs of inputs to production process								
A change in technology								
A change in the number of producers in the market								
Government policies								

Equilibrium Price and Equilibrium Quantity

Figure 14.1 below shows the demand for Greebes and the supply of Greebes. Plot these data on the axes in Figure 14.2. Label the demand curve D and label the supply curve S. Then answer the questions that follow. Fill in the answer blanks, or underline the correct answer in parentheses.



Figure 14.1

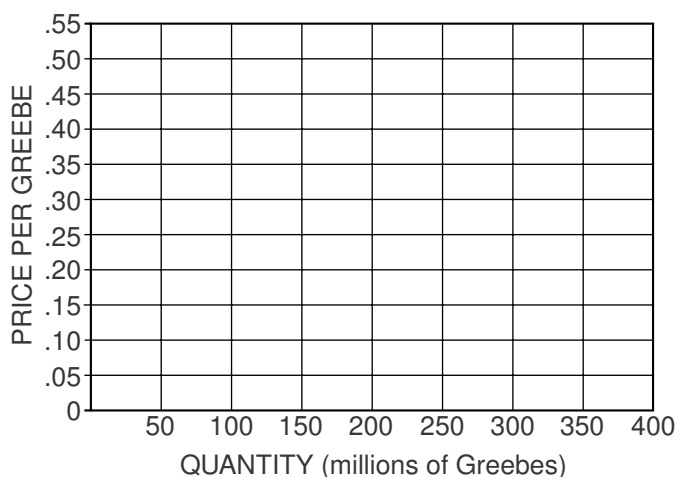
Demand for and Supply of Greebes

Price (\$ per Greebe)	Quantity Demanded (millions of Greebes)	Quantity Supplied (millions of Greebes)
\$.15	300	100
.20	250	150
.25	200	200
.30	150	250
.35	100	300



Figure 14.2

Demand for and Supply of Greebes



- Under these conditions, competitive market forces would tend to establish an equilibrium price of _____ per Greebe and an equilibrium quantity of _____ million Greebes.
- If the price currently prevailing in the market is \$0.30 per Greebe, buyers would want to buy _____ million Greebes and sellers would want to sell _____ million Greebes. Under these conditions, there would be a (*shortage / surplus*) of _____ million Greebes. Competitive market forces would tend to cause the price to (*increase / decrease*) to a price of _____ per Greebe.

At this new price, buyers would now want to buy _____ million Greebes, and sellers now want to sell _____ million Greebes. Because of this change in (*price / underlying conditions*), the

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(*demand / quantity demanded*) changed by _____ million Greebes, and the (*supply / quantity supplied*) changed by _____ million Greebes.

3. If the price currently prevailing in the market is \$0.20 per Greebe, buyers would want to buy _____ million Greebes, and sellers would want to sell _____ million Greebes. Under these conditions, there would be a (*shortage / surplus*) of _____ million Greebes. Competitive market forces would tend to cause the price to (*increase / decrease*) to a price of _____ per Greebe. At this new price, buyers would now want to buy _____ million Greebes, and sellers now want to sell _____ million Greebes. Because of this change in (*price / underlying conditions*), the (*demand / quantity demanded*) changed by _____ million Greebes, and the (*supply / quantity supplied*) changed by _____ million Greebes.

4. Lightly shade the area of consumer surplus and producer surplus.

(A) If the government sets the price at \$0.35 and the quantity exchanged is 100 million Greebes, what will happen to the size of the combined total of consumer and producer surplus?

(B) What does this say about the market system?

5. Now, suppose a mysterious blight causes the supply schedule for Greebes to change to the following:



Figure 14.3

New Supply of Greebes

Price (\$ per Greebe)	Quantity Supplied (millions of Greebes)
\$0.20	50
.25	100
.30	150
.35	200

Plot the new supply schedule on the axes in Figure 14.2 and label it S_1 . Label the new equilibrium E_1 . Under these conditions, competitive market forces would tend to establish an equilibrium price of _____ per Greebe and an equilibrium quantity of _____ million Greebes.

Compared with the equilibrium price in Question 1, we say that because of this change in (*price / underlying conditions*), the (*supply / quantity supplied*) changed; and both the equilibrium price and the equilibrium quantity changed. The equilibrium price (*increased / decreased*), and the equilibrium quantity (*increased / decreased*).

Compared with the consumer and producer surpluses in Question 4, consumer surplus has (*increased / decreased*), and producer surplus has (*increased / decreased*).

6. Now, with the supply schedule at S_1 , suppose further that a sharp drop in people's incomes as the result of a prolonged recession causes the demand schedule to change to the following:



Figure 14.4

New Demand for Greebes

Price (\$ per Greebe)	Quantity Demanded (millions of Greebes)
\$.15	200
.20	150
.25	100
.30	50

Plot the new demand schedule on the axes in Figure 14.2 and label it D_1 . Label the new equilibrium E_2 . Under these conditions, with the supply schedule at S_1 , competitive market forces would tend to establish an equilibrium price of _____ per Greebe and an equilibrium quantity of _____ million Greebes. Compared with the equilibrium price in Question 5, because of this change in (*price / underlying conditions*), the (*demand / quantity demanded*) changed. The equilibrium price (*increased / decreased*), and the equilibrium quantity (*increased / decreased*).

Shifts in Supply and Demand

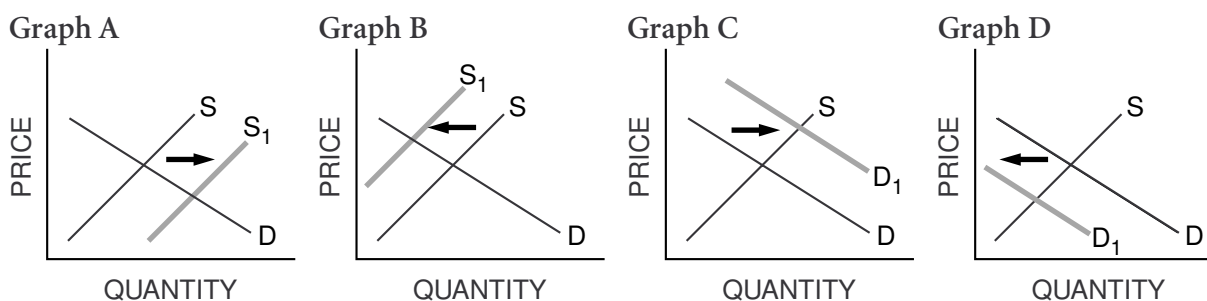
Part A

Fill in the blanks with the letter of the graph that illustrates each situation. You may use a graph more than once.



Figure 15.1

Jelly Beans Supply and Demand



1. The price of sugar increases. _____
2. The price of bubble gum, a close substitute for jelly beans, increases. _____
3. A machine is invented that makes jelly beans at a lower cost. _____
4. The government places a tax on foreign jelly beans, which have a considerable share of the market. _____
5. The price of soda, a complementary good for jelly beans, increases. _____
6. Widespread prosperity allows people to buy more jelly beans. _____

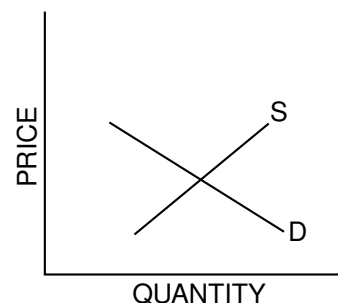
Activity written by Margaret Hamilton, Canton Country Day School, Canton, Ohio; Mary Kohelis, Brooke High School, Wellsburg, W. Va.; John Morton, National Council on Economic Education, New York, N.Y., and Francis Vottero, Shamokin Area High School, Shamokin, Pa. Part B adapted from G. Yohe, *Instructor's Resource Manual for Samuelson and Nordhaus Economics*, 14th ed. (New York: McGraw Hill College Division, 1992), p. 16.

Part B

Connecticut ships large amounts of apples to all parts of the United States by rail. Circle the words that show the effects on price and quantity for each situation, and complete the graphs below, showing how a hurricane that destroys apples before they are picked in Connecticut might affect the price and quantity of each commodity. Then provide your reasoning.

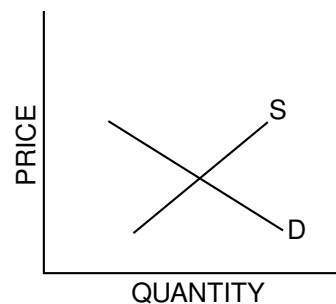
7. Apples in Boston

Price:	Rises	Unchanged	Falls
Quantity:	Rises	Unchanged	Falls
Reason:			



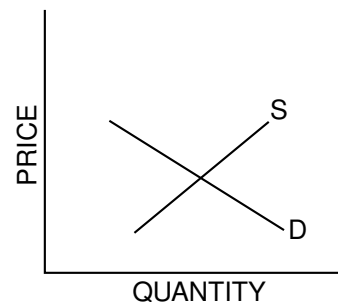
8. Land devoted to apple orchards in the state of Washington

Price:	Rises	Unchanged	Falls
Quantity:	Rises	Unchanged	Falls
Reason:			



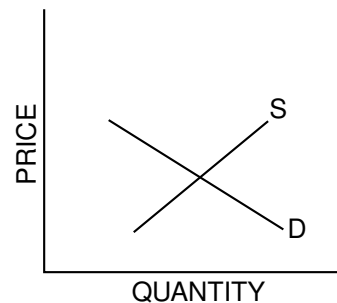
9. Apples grown in the state of Washington

Price:	Rises	Unchanged	Falls
Quantity:	Rises	Unchanged	Falls
Reason:			



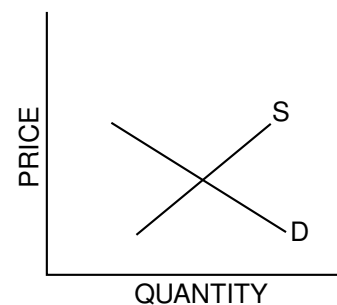
10. **Pears**

Price:	Rises	Unchanged	Falls
Quantity:	Rises	Unchanged	Falls
Reason:			



11. **Apple pies**

Price:	Rises	Unchanged	Falls
Quantity:	Rises	Unchanged	Falls
Reason:			



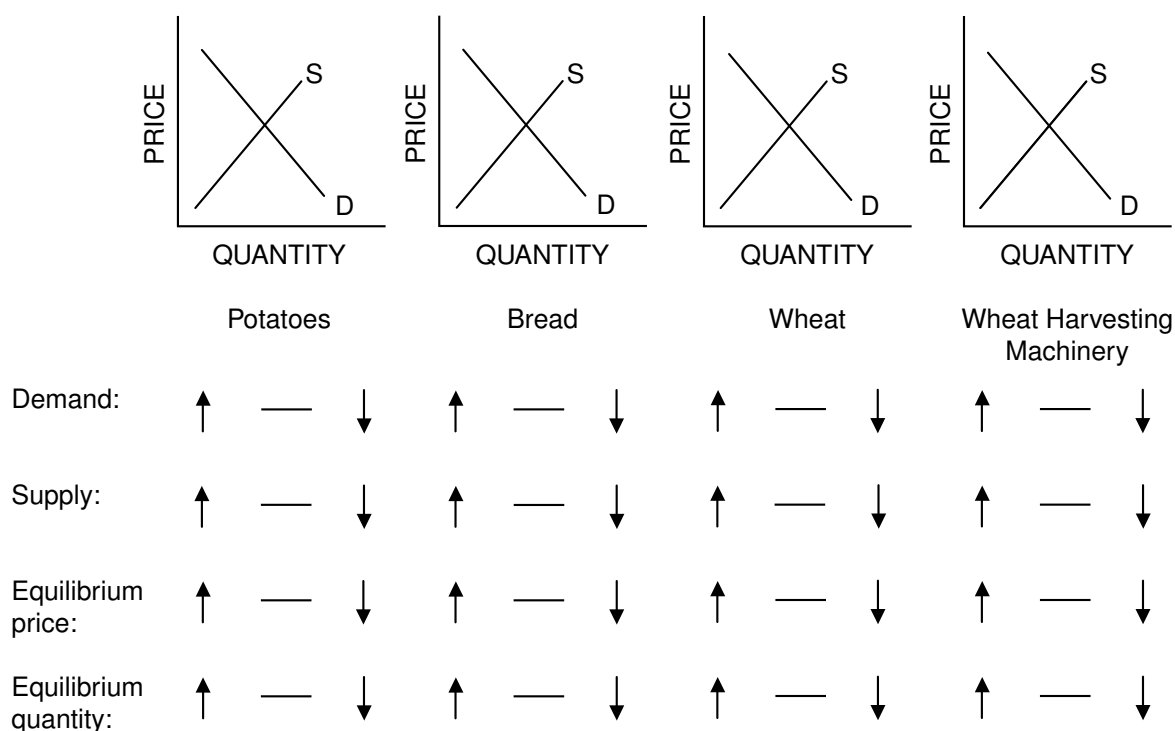
How Markets Allocate Resources

The following questions refer to a group of related markets in the United States during a long period of time. Assume that the markets are perfectly competitive and that the supply and demand model is completely applicable. The figures show the supply and demand in each market *before* the assumed change occurs. Trace through the effects of the assumed change, *other things constant*. Work your way from left to right. Shift only one curve in each market. For each market, draw whatever new supply or demand curves are needed, labeling each new curve S_1 or D_1 . Then circle the correct symbol under each diagram (\uparrow for increase, $—$ for unchanged, and \downarrow for decrease). Remember to shift only one curve in each market.

1. Assume that a new fertilizer dramatically increases the number of potatoes that can be harvested with no additional labor or machinery. Also assume that this fertilizer does not affect wheat farming and that people are satisfied to eat either potatoes or bread made from wheat flour.



Figure 16.1
Effects of a New Fertilizer



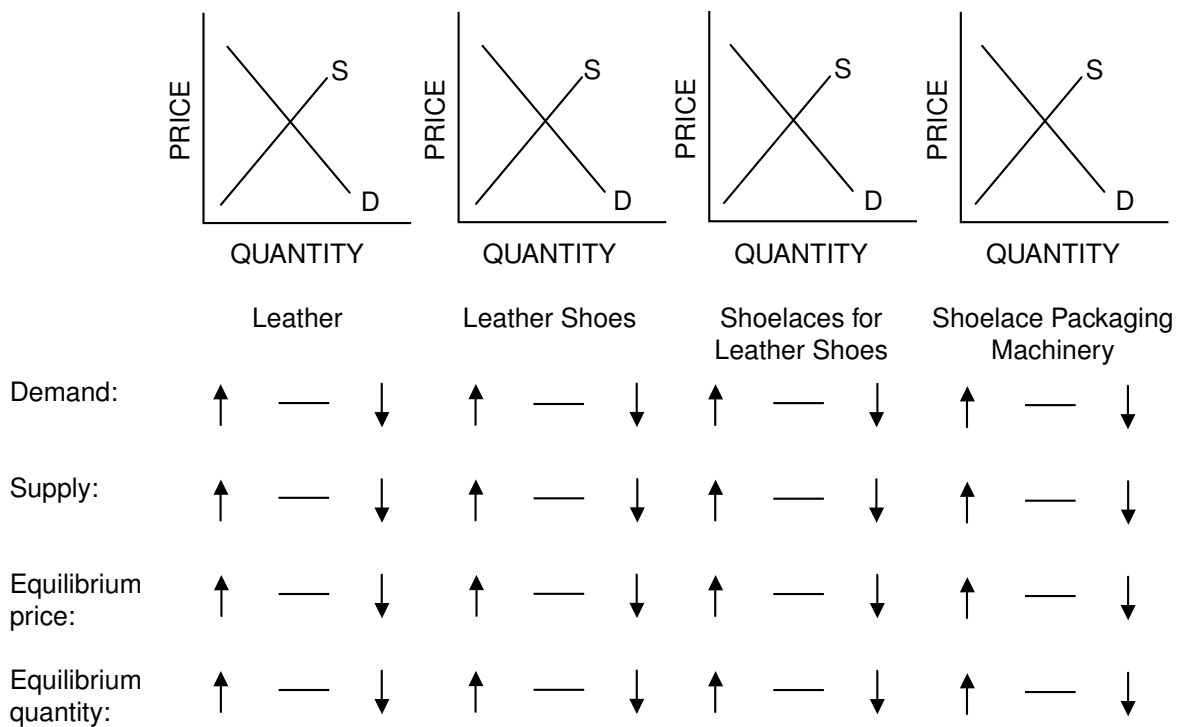
Adapted from Phillip Saunders, *Introduction to Microeconomics: Student Workbook*, 18th ed. (Bloomington, Ind., 1998). Copyright © 1998 Phillip Saunders. All rights reserved.

2. Assume people's tastes change and there is an increase in the demand for briefcases and luggage made of leather. How would this affect the leather market and related markets? Draw the new curves and circle the appropriate symbols in all four markets.




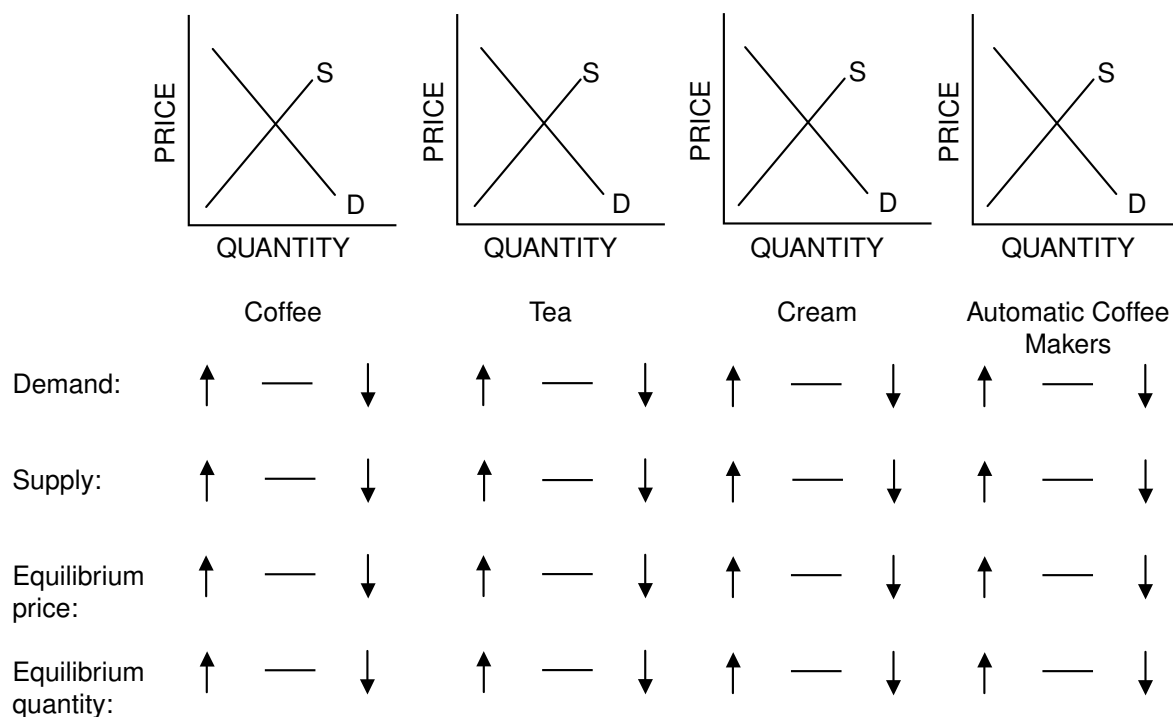
Figure 16.2

Effects of Increased Demand for Briefcases and Luggage



3. Assume that a heavy frost destroys half the world's coffee crop and that people use more cream in coffee than they do in tea.

 Figure 16.3
Effects of a Loss of Coffee Crop

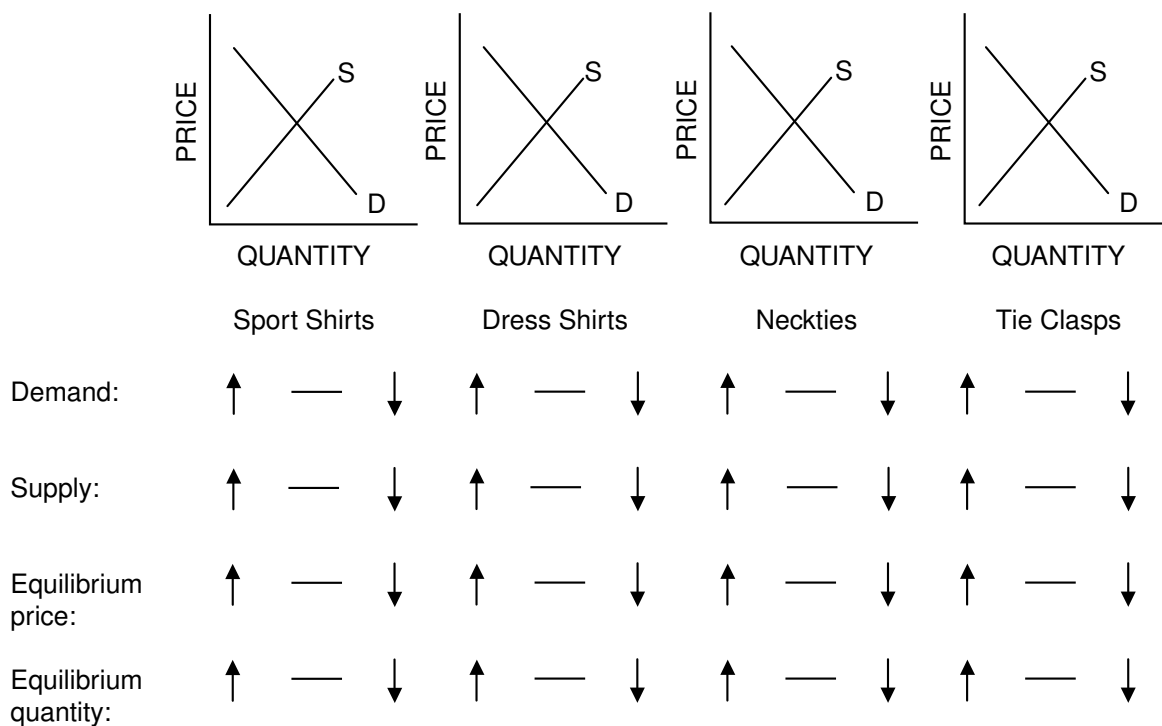


4. Assume people's tastes change in favor of colored sports shirts, which are worn without neckties, and against white dress shirts, which are worn with neckties and tie clasps.



Figure 16.4

Effects of a Shift to Sports Shirts



Elasticity: An Introduction

In many circumstances, it is not enough for an economist, policymaker, firm or consumer to simply know the direction in which a variable will be moving. For example, if I am a producer, the law of demand tells me that if I increase the price of my good, the quantity demanded by consumers will decrease. The law of demand doesn't tell me what will happen to my total revenue (the price of the good times the number of units sold), however. Whether total revenue increases or decreases depends on how responsive the quantity demanded is to the price change. Will it decrease a little? A lot? Throughout the discipline of economics, in fact, the responsiveness of one variable to changes in another variable is an important piece of information. In general, *elasticity* is a measurement of how responsive one variable is to a change in another variable — that is, how elastic one variable is given a change in the other, *ceteris paribus* (that is, holding all other variables constant).

Because elasticity measures responsiveness, changes in the variables are measured relative to some base or starting point. Consider the following elasticity measurements:

The price elasticity of demand, ϵ_d :

$$\epsilon_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

The income elasticity of demand, ϵ_d :

$$\epsilon_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

The price elasticity of supply, ϵ_s :

$$\epsilon_s = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}}$$

The wage elasticity of labor supply, ϵ_{ls} :

$$\epsilon_{ls} = \frac{\text{percentage change in quantity of labor supplied}}{\text{percentage change in wage}}$$

Part A**Extra-Credit Problems**

1. Now, suppose that your economics teacher currently allows you to earn extra credit by submitting answers to the end-of-the-chapter questions in your textbook. The number of questions you're willing to submit depends on the amount of extra credit for each question. How responsive you are to a change in the extra-credit points the teacher gives can be represented as an *elasticity*. Write the formula for the elasticity of extra-credit problems submitted:

$$\epsilon_{ps} = \underline{\hspace{4cm}}$$

2. Now, consider that your teacher's goal is to get you to submit twice as many questions: a 100-percent increase. Underline the correct answer in parentheses.
 - (A) If the number of chapter-end questions you submit *is* very responsive to a change in extra-credit points, then a given increase in extra credit elicits a large increase in questions submitted. In this case, your teacher will need to increase the extra-credit points by (*more than* / *less than* / *exactly*) 100 percent.
 - (B) If the number of chapter-end questions you submit *is not* very responsive to a change in extra-credit points, then a given increase in extra credit elicits a small increase in questions submitted. In this case, your teacher will need to increase the extra-credit points by (*more than* / *less than* / *exactly*) 100 percent.

Part B

The Price Elasticity of Demand

It’s easy to imagine that there are many applications for the elasticity concept. Here we will concentrate on the price elasticity of demand for goods and services. For convenience, the measure is repeated here:

$$\epsilon_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

Note the following points:

- Price elasticity of demand is always measured *along* a demand curve. When measuring the responsiveness of quantity demanded to a change in price, all other variables must be held constant.
- The price elasticity of demand is typically reported as a positive number, even though the calculation itself is negative; price and quantity demanded move in opposite directions.
- Along a linear demand curve, there are price ranges over which demand is elastic, unit elastic and inelastic.



Figure 17.1

Relationship Between Changes in Quantity Demanded and Price

Percentage change in quantity demanded	>	percentage change in price	> 1	Elastic
Percentage change in quantity demanded	=	percentage change in price	= 1	Unit elastic
Percentage change in quantity demanded	<	percentage change in price	< 1	Inelastic

Part C

Calculating the Arc Elasticity Coefficient

The arc elasticity calculation method is obtained when the midpoint or average price and quantity are used in the calculation. This is reflected in the formula below.

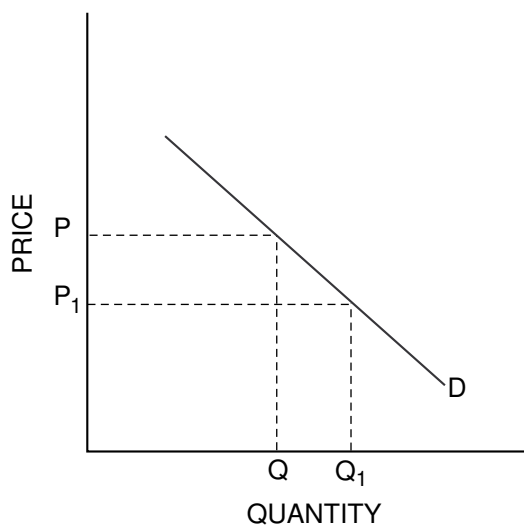
$$\epsilon_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}} = \frac{\frac{Q - Q_1}{(Q + Q_1) / 2}}{\frac{P - P_1}{(P + P_1) / 2}} = \frac{\frac{\Delta Q}{(Q + Q_1) / 2}}{\frac{\Delta P}{(P + P_1) / 2}}$$

If we have the consumer's or market demand curves, we can precisely calculate the elasticity value, or coefficient. Suppose that price is increased (decreased) from P to P_1 and so quantity demanded decreases (increases) from Q to Q_1 .



Figure 17.2

Calculating the Arc Elasticity Coefficient



By making all numbers positive, we've in effect taken the absolute values of these changes, and so the elasticity coefficient will be positive. Note that we have used the average of the two prices and the two quantities. We have done this so that the elasticity measured will be the same whether we are moving from Q to Q_1 or the other way around.

Part D

Coffee Problems

Suppose Moonbucks, a national coffee-house franchise, finally moves into the little town of Middle-ofnowhere. Moonbucks is the only supplier of coffee in town and faces the following demand schedule each week. Write the correct answer on the answer blanks, or underline the correct answer in parentheses.



Figure 17.3

Cups of Coffee Demanded per Week

Price (per cup)	Quantity Demanded
\$6	80
5	100
4	120
3	140
2	160
1	180
0	200

3. What is the arc price elasticity of demand when the price changes from \$1 to \$2? _____

$$\epsilon_d = \frac{\frac{\Delta Q}{(Q + Q_1) / 2}}{\frac{\Delta P}{(P + P_1) / 2}} = \frac{\quad}{\quad} = \quad$$

So, over this range of prices, demand is (*elastic / unit elastic / inelastic*).

4. What is the arc price elasticity of demand when the price changes from \$5 to \$6? _____

$$\epsilon_d = \frac{\frac{\Delta Q}{(Q + Q_1) / 2}}{\frac{\Delta P}{(P + P_1) / 2}} = \frac{\quad}{\quad} = \quad$$

So, over this range of prices, demand is (*elastic / unit elastic / inelastic*).

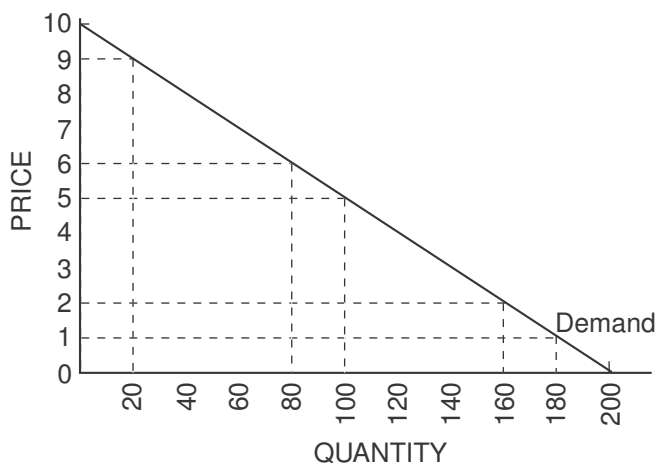
Note: Because the relationship between quantity demanded and price is inverse, price elasticity of demand would always be negative. Economists believe using negative numbers is confusing when referring to “large” or “small” elasticities of demand. Therefore, they use absolute or positive numbers, changing the sign on the negative numbers.

Part E

Now, consider Figure 17.4, which graphs the demand schedule given in Figure 17.3.

Recall the slope of a line is measured by the rise over the run: $\text{slope} = \text{rise} / \text{run} = \Delta P / \Delta Q$.

* Figure 17.4
Elasticity of Demand for Coffee



- Using your calculations of ΔP and ΔQ from Question 3, calculate the slope of the demand curve.

- Using your calculations of ΔP and ΔQ from Question 4, calculate the slope of the demand curve.

- The law of demand tells us that an increase in price results in a decrease in the quantity demanded. Questions 5 and 6 remind us that the slope of a straight line is *constant everywhere along the line*. Along this demand curve, a change in price of \$1 generates a change in quantity demanded of 20 cups of coffee a week.

You've now shown mathematically that while the slope of the demand curve is related to elasticity, the two concepts are not the same thing. Briefly discuss the relationship between where you are along the demand curve and the elasticity of demand. How does this tie into the notion of *responsiveness*?

The Determinants of Elasticity of Demand

Suppose we don't know the precise demand schedule for electricity and there is a 20 percent increase in the price of a kilowatt hour of electricity. We know that quantity demanded will decrease, but will it be by less than 20 percent (inelastic demand), exactly 20 percent (unit elastic) or more than 20 percent (elastic demand)? What factors influence the price elasticity of demand? (Remember, *ceteris paribus*!)

Part A

Consider the following representative households in our market for electricity:

Household A: Uses electricity for lighting, appliances and heating.

Household B: Uses electricity for lighting, appliances and heating. Has a heating system that can, with one day's labor, be switched to burn natural gas.

1. Household _____ will have the more elastic demand because of the presence of a _____ good.
 2. Because Household A has no available substitutes, should we assume that the quantity demanded of electricity will remain unchanged given the increase in price? _____
Do you think Household A's response will be elastic or inelastic? _____
 3. Illustrate the same concept identified above by placing a 1, 2 or 3 by each item below, denoting the least price elastic to the most price elastic. Explain your reasoning.
_____ Demand for insulin
_____ Demand for Granny Smith apples
_____ Demand for running shoes
- Rationale:

4. To summarize: Demand is (*more / less*) elastic for goods with many available substitutes.

Part B

Consider the following representative households in the electricity market:

Household A: Currently spends \$300 a month on electricity.

The household income is \$1,200 a month.

Household B: Currently spends \$300 a month on electricity.

The household income is \$3,600 a month.

5. Household _____ will have the more-elastic demand, as the expenditures on this good account for a (*smaller / larger*) proportion of its income.
6. Illustrate the same concept identified above by placing a 1, 2 or 3 by each item below, denoting the least elastic to the most elastic. Explain your reasoning.
- _____ Demand for chewing gum
- _____ Demand for automobiles
- _____ Demand for clothing

Rationale:

7. To summarize: Goods that command a (*small / large*) proportion of a consumer's income tend to be more price elastic.

Part C

We expect that the price elasticity of demand will also vary with the nature of the good being considered. Is it a necessity? A durable good? Are we considering the short run or the long run? Consider the following alternatives, and underline the option that correctly completes each statement.

8. The price elasticity of demand for cigarettes: A product that is considered to be a necessity will have a relatively price (*elastic / inelastic*) demand.
9. The price elasticity of demand for automobiles: In the short run, consumers can postpone the purchase of durable goods, and so such goods will have a relatively price (*elastic / inelastic*) demand.
10. Briefly summarize how the nature of the good — necessity, durable good or luxury good — and the time frame affect the price elasticity of demand for electricity.

Part D

Now, suppose that prices in the market for electricity remain constant, but consumers' income increases by 30 percent. Again, we may not know the precise demand schedule but may still be able to use notions of elasticity to speculate about what will happen to demand.

Recall the income elasticity of demand, ϵ_d :

$$\epsilon_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

Note in this case, income and quantity demanded are the relevant variables. All other variables, including the price of electricity, are held constant.

11. In measurements of elasticity, if income and quantity demanded move in the opposite direction — that is, if one increases while the other decreases — then the elasticity coefficient will be (*positive / negative*).
12. Remember that if income increases, the demand for a normal good increases and demand for an inferior good decreases. If the good is a normal good, income elasticity will be (*negative / positive*). If it is an inferior good, income elasticity will be (*negative / positive*).

Elasticity and Total Revenue

Consider the following: total revenue (TR) = price (P) x quantity demanded (Q_d).

The responsiveness of quantity demanded to changes in price will determine whether a price increase leads to an increase or decrease in the total revenue generated.

The law of demand tells us that a price increase (decrease) will result in a decrease (increase) in quantity demanded: They move in opposite directions. What happens to TR when price changes is determined by the dominant effect, either the price effect or the quantity effect. In this case, knowing the price elasticity of demand solves the problem.

Consider that

- $\epsilon_d < 1 \Rightarrow \% \Delta \text{ in } Q_d < \% \Delta \text{ in price} \Rightarrow$ The *price effect* dominates.
 If price is increasing ($Q_d \downarrow$ by less), TR will increase.
 If price is decreasing ($Q_d \uparrow$ by less), TR will decrease.
- $\epsilon_d = 1 \Rightarrow \% \Delta \text{ in } Q_d = \% \Delta \text{ in price} \Rightarrow$ Neither effect dominates. TR remains unchanged.
- $\epsilon_d > 1 \Rightarrow \% \Delta \text{ in } Q_d > \% \Delta \text{ in price} \Rightarrow$ The *quantity effect* dominates.
 If price is increasing ($Q_d \downarrow$ by more), TR will decrease.
 If price is decreasing ($Q_d \uparrow$ by more), TR will increase.

Use this information to do the problems below. Fill in the blank or underline the correct answer.

- Price rises from $P = \$5$ to $P_1 = \$6$, and quantity demanded decreases from $Q = 15$ to $Q_1 = 10$.
 - The coefficient of elasticity equals _____.
 - | | | | | |
|-------|---|-------|---|-------|
| P | x | Q | = | TR |
| _____ | x | _____ | = | _____ |
 - | | | | | |
|-------|---|-------|---|--------|
| P_1 | x | Q_1 | = | TR_1 |
| _____ | x | _____ | = | _____ |
 - $P (\downarrow / \uparrow)$; $TR (\downarrow / \uparrow)$ Demand is (*elastic / unit elastic / inelastic*).
- Price decreases from $P = \$10$ to $P_1 = \$9$, and quantity demanded increases from $Q = 100$ to $Q_1 = 110$.
 - The coefficient of elasticity equals _____.
 - | | | | | |
|-------|---|-------|---|-------|
| P | x | Q | = | TR |
| _____ | x | _____ | = | _____ |
 - | | | | | |
|-------|---|-------|---|--------|
| P_1 | x | Q_1 | = | TR_1 |
| _____ | x | _____ | = | _____ |
 - $P (\downarrow / \uparrow)$; $TR (\downarrow / \uparrow)$ Demand is (*elastic / unit elastic / inelastic*).

Applying Elasticity to the Real World

Each of the following stories contains an assumption about elasticity of demand. In (A) for each story, decide whether the person's conclusion is right or wrong. In (B) explain your reasoning.

1. I.M. Politico, a candidate for the state legislature, is proposing a large increase in the tax on cigarettes and liquor. He says, "I'm not proposing these taxes to raise revenue but to discourage reckless drinking and the filthy smoking habit. If the prices of cigarettes and liquor go up, most people will quit using them. After all, no one needs to drink or smoke."
(A)
(B)
2. U.R. Kool, a candidate for Congress, proposes freezing the price of gasoline. "There is no substitute for gasoline," he says. "People have to get from one place to another. Economists who say higher prices will discourage people from buying as much gas as before don't live in the real world."
(A)
(B)
3. Councilman Vic Acqua opposed a price increase for water during a recent drought. He claimed that there is no substitute for water. He believes an increase in the price of water (water taxes) will result in the same quantity of water used as before the price went up.
(A)
(B)
4. Sky King, world traveler, says if the airlines want to increase total revenue, they should lower fares for business travelers as well as for vacationers. Both groups should respond equally to a price decrease.
(A)
(B)

From *Master Curriculum Guide in Economics: Teaching Strategies for High School Economics Courses* (New York: National Council on Economic Education, 1985), p. 95

Excise Taxes

Suppose Figures 21.1 and 21.2 show the current supply of Greebes.



Figure 21.1

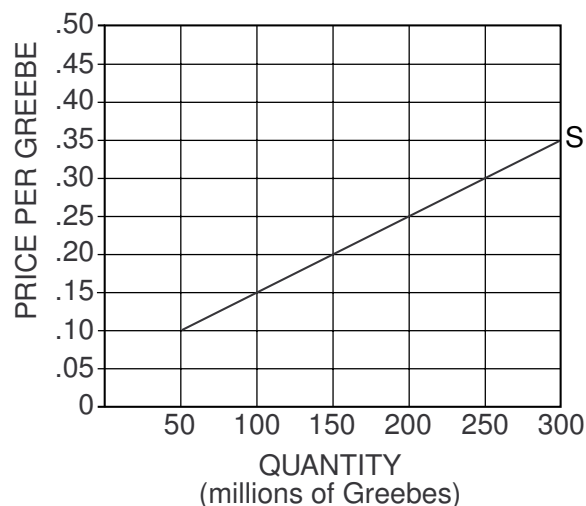
Table of Current Supply Schedule of Greebes

Quantity (millions)	Supply Price Before Tax (\$ per Greebe)	Supply Price After Tax (\$ per Greebe)
50	\$.10	
100	.15	
150	.20	
200	.25	
250	.30	
300	.35	



Figure 21.2

Current Supply Schedule of Greebes



Now, suppose that (to raise revenue for higher education) the government enacts an excise (sales) tax of \$0.15 per Greebe. *This tax will result in a new supply curve for Greebes.* To determine where this new supply curve lies, reason as follows: If before the tax, firms were willing to supply 50 million Greebes at a price of \$0.10, they would now be willing to supply 50 million Greebes only if the price were \$0.25. (Remember: \$0.15 of the price of each Greebe sold is now going to go to the government. So, if the price is \$0.25 and the government is getting \$0.15 of this price, then the seller is receiving the remaining \$0.10.)

Fill in the blank spaces in the table, and draw in the new supply curve that results from the tax. Label the new supply curve S_T .

Adapted from Phillip Saunders, *Introduction to Microeconomics: Student Workbook*, 18th ed. (Bloomington, Ind., 1998).
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What will be the result of this excise (sales) tax on the equilibrium quantity of Greebes? The equilibrium price paid by buyers (P_B)? The equilibrium price received by sellers (P_S)? The revenue received by the government? The income, or revenue, received by sellers after the tax?

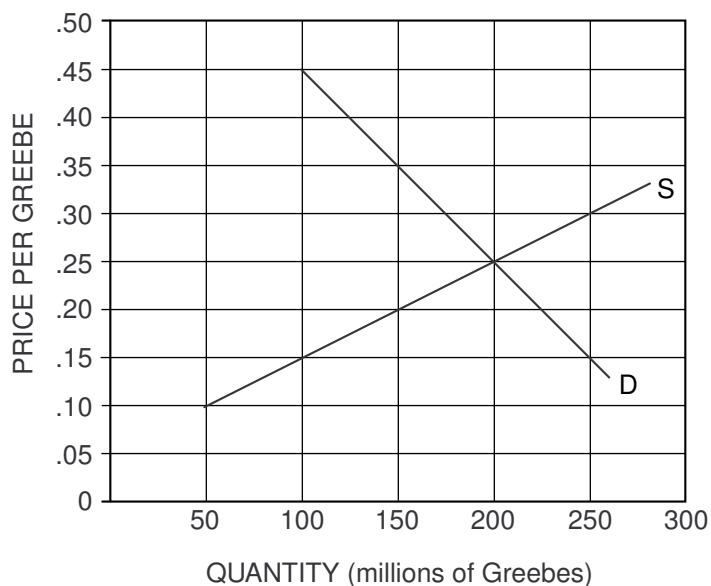
The answers to these important questions will depend on the nature of the demand for Greebes. The next section of this activity will help you determine the effects of a \$0.15 excise tax on Greebes under four different demand conditions.

Part A



Figure 21.3

Relatively Inelastic Demand for Greebes as Compared with D_1 on Figure 21.4



- On Figure 21.3 above, the equilibrium quantity of Greebes is _____ million Greebes.
- On Figure 21.3, the equilibrium price of Greebes is _____ per Greebe.
- Buyers are spending a total of _____ million on Greebes.
- Sellers are receiving a total of _____ million from selling Greebes.
- If an excise tax of \$0.15 for each Greebe sold is levied on the sellers of Greebes, the equilibrium price paid by buyers (P_B) will differ from the equilibrium price received by sellers (P_S) by the amount of the tax. Add the new supply curve incorporating the tax to the graph and indicate P_B and P_S . This \$0.15 goes to the government. Under these circumstances:
 - The new equilibrium quantity of Greebes would be _____ million.
 - The new equilibrium price paid by buyers would be _____ per Greebe.

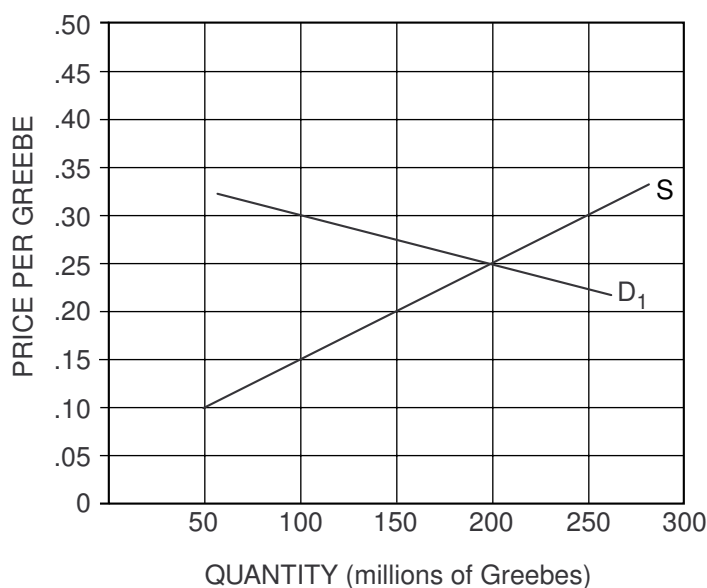
- (C) The new equilibrium price received by sellers (after tax) would be _____ per Greebe.
- (D) Buyers would spend a total of _____ million on Greebes.
- (E) Sellers would receive a total of _____ million (after tax) from selling Greebes.
- (F) The government revenue from this tax would be _____ million.
- (G) _____ million of this revenue would be paid by buyers in the form of higher prices.
- (H) _____ million of this revenue would be paid by sellers in the form of reduced income.
- (I) As a result of the tax, buyers will buy a smaller quantity than before the tax. If so, the sellers would also have a loss of revenue that is not collected by the government. In this case, the *uncollected revenue loss* would be equal to _____ million.

Part B



Figure 21.4

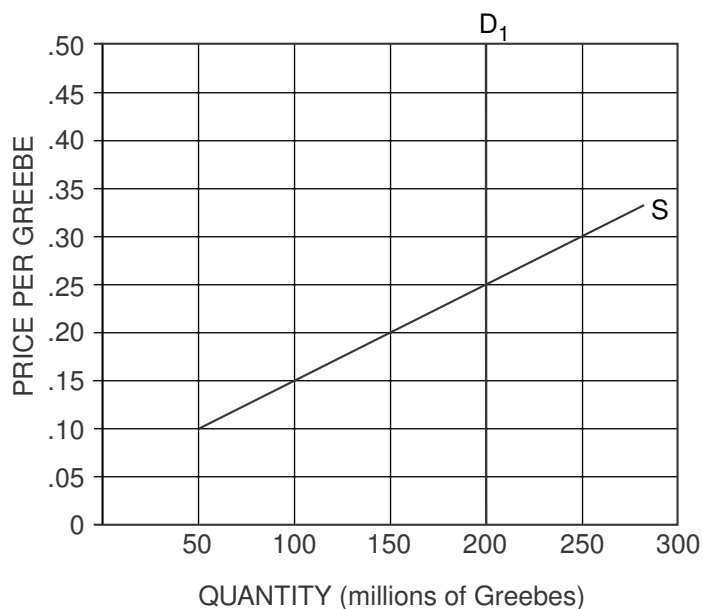
Relatively Elastic Demand for Greebes as Compared with D in Figure 21.3



6. On Figure 21.4, the equilibrium quantity of Greebes is _____ million.
7. On Figure 21.4, the equilibrium price of Greebes is _____ per Greebe.
8. Buyers are spending a total of _____ million on Greebes.
9. Sellers are receiving a total of _____ million from selling Greebes.
10. If an excise tax of \$0.15 for each Greebe sold is levied on the sellers of Greebes, the equilibrium price paid by buyers (P_B) will differ from the equilibrium price received by sellers (P_S) by the amount of the tax. This \$0.15 goes to the government. Add the new supply curve incorporating the tax to the graph, and indicate P_B and P_S . Under these circumstances:
 - (A) The new equilibrium quantity of Greebes would be _____ million.
 - (B) The new equilibrium price paid by buyers would be _____ per Greebe.
 - (C) The new equilibrium price received by sellers (after tax) would be _____ per Greebe.
 - (D) Buyers would spend a total of _____ million on Greebes.
 - (E) Sellers would receive a total of _____ million (after tax) from selling Greebes.
 - (F) The government revenue from this tax would be _____ million.
 - (G) _____ million of this revenue would be paid by buyers in the form of higher prices.
 - (H) _____ million of this revenue would be paid by sellers in the form of reduced income.
 - (I) As a result of the tax, buyers will buy a smaller quantity than before the tax. If so, the sellers would also have a loss of revenue that is not collected by the government. In this case, the *uncollected revenue loss* would be equal to _____ million.

Part C


 Figure 21.5
 Perfectly Inelastic Demand for Greebes



11. On Figure 21.5, the equilibrium quantity of Greebes is _____ million.
12. On Figure 21.5, the equilibrium price of Greebes is _____ per Greebe.
13. Buyers are spending a total of _____ million on Greebes.
14. Sellers are receiving a total of _____ million from selling Greebes.
15. If an excise tax of \$0.15 for each Greebe sold is levied on the sellers of Greebes, the equilibrium price paid by buyers (P_B) will differ from the equilibrium price received by sellers (P_S) by the amount of the tax. This \$0.15 goes to the government. Add the new supply curve incorporating the tax to the graph, and indicate P_B and P_S . Under these circumstances:
 - (A) The new equilibrium quantity of Greebes would be _____ million.
 - (B) The new equilibrium price paid by buyers would be _____ per Greebe.
 - (C) The new equilibrium price received by sellers (after tax) would be _____ per Greebe.
 - (D) Buyers would spend a total of _____ million on Greebes.
 - (E) Sellers would receive a total of _____ million (after tax) from selling Greebes.

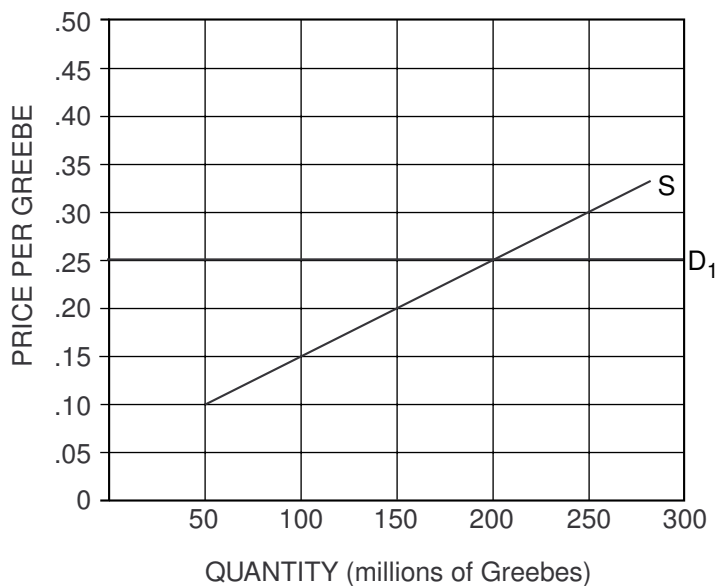
- (F) The government revenue from this tax would be _____ million.
- (G) _____ million of this revenue would be paid by buyers in the form of higher prices.
- (H) _____ million of this revenue would be paid by sellers in the form of reduced income.
- (I) As a result of the tax, buyers will buy a smaller quantity than before the tax. If so, the sellers would also have a loss of revenue that is not collected by the government. In this case, the *uncollected revenue loss* would be equal to _____ million.

Part D



Figure 21.6

Perfectly Elastic Demand for Greebes



16. On Figure 21.6, the equilibrium quantity of Greebes is _____ million.
17. On Figure 21.6, the equilibrium price of Greebes is _____ per Greebe.
18. Buyers are spending a total of _____ million on Greebes.
19. Sellers are receiving a total of _____ million from selling Greebes.

20. If an excise tax of \$0.15 for each Greebe sold is levied on the sellers of Greebes, the equilibrium price paid by buyers (P_B) will differ from the equilibrium price received by sellers (P_S) by the amount of the tax. This \$0.15 goes to the government. Add the new supply curve incorporating the tax to the graph and indicate P_B and P_S . Under these circumstances:
- (A) The new equilibrium quantity of Greebes would be _____ million.
 - (B) The new equilibrium price paid by buyers would be _____ per Greebe.
 - (C) The new equilibrium price received by sellers (after tax) would be _____ per Greebe.
 - (D) Buyers would spend a total of _____ million on Greebes.
 - (E) Sellers would receive a total of _____ million (after tax) from selling Greebes.
 - (F) The government revenue from this tax would be _____ million.
 - (G) _____ million of this revenue would be paid by buyers in the form of higher prices.
 - (H) _____ million of this revenue would be paid by sellers in the form of reduced income.
 - (I) As a result of the tax, buyers will buy a smaller quantity than before the tax. If so, the sellers would also have a loss of revenue that is not collected by the government. In this case, the *uncollected revenue loss* would be equal to _____ million.

Part E

21. A famous Supreme Court justice once said, "The power to tax is the power to destroy" sellers. This is more likely to be true the more the demand for the product taxed is relatively (*elastic / inelastic*).
22. If you were a government revenue agent interested in getting the most tax revenue possible, you would suggest putting excise taxes on goods whose demand is (*elastic / unit elastic / inelastic*).
23. Think of some real-world goods on which excise taxes are placed: liquor, cigarettes, gasoline. Do you think that the demand for these goods is relatively elastic or relatively inelastic? Why?

Part F

Consider this newspaper quotation and answer the questions that follow: “The city is planning to place a 10 percent tax on auto parking. The tax would fall on every motorist who uses a space in either the garages and the lots operated by the Public Parking Authority or in privately operated lots and garages.”

24. Draw the demand curve and the long-run supply curve for parking lots. Explain why each has the shape you show; in other words, why each is relatively elastic or inelastic.
25. Given the curves you have drawn in Question 24, show the effect of introducing a 10 percent tax: How does the equilibrium position after imposition of the tax compare with the initial equilibrium position?
26. The newspaper quotation implies that the “burden” of the tax will fall entirely upon the driver. Is this true for the case you have developed in Questions 24 and 25 above? Under what circumstances would this be true?

Maximum and Minimum Price Controls

Prices send signals and provide incentives to buyers and sellers. When supply or demand changes, market prices adjust, affecting incentives. High prices induce extra production while they discourage consumption.

In this exercise, we discover how the imposition of price controls (maximum or minimum prices) interrupts the process that matches production with consumption. *Price ceilings* (maximum prices) sometimes appear in the form of rent control, utility prices and other caps on upward price pressure. *Price floors* (minimum prices) also occur in the form of prevailing wages and minimum wages.

When government imposes price controls, citizens should understand that some people gain and some people lose from every policy change. By understanding the consequences of legal price regulations, citizens are able to weigh the costs and benefits of the change.

As a general rule, price floors create a *surplus* of goods or services, or *excess supply*, since the quantity demanded of goods is less than the quantity supplied. Conversely, price ceilings generate *excess quantity demanded*, causing shortages.



Figure 22.1
Price Floors and Ceilings



Price floors and ceilings can be plotted with supply and demand curves. Use Figure 22.1 to answer the questions. Fill in the answer blanks or underline the correct words in parentheses.

1. What is the market price? _____
2. What quantity is demanded and what quantity is supplied at the market price?
 - (A) Quantity demanded _____
 - (B) Quantity supplied _____

Adapted from *Capstone Student Activities* (New York: National Council on Economic Education, 1989), p. 57.

3. What quantity is demanded and what quantity is supplied if the government passes a law requiring the price to be no higher than \$30? This is called a *price ceiling*.
- (A) Quantity demanded _____
- (B) Quantity supplied _____
- (C) There is a (*shortage / surplus*) of _____ .
4. What quantity is demanded and what quantity is supplied if the government passes a law requiring the price to be no lower than \$80? This is called a *price floor*.
- (A) Quantity demanded _____
- (B) Quantity supplied _____
- (C) There is a (*shortage / surplus*) of _____ .
- (D) What happens to total consumer or producer surplus? _____
- (E) Is society better or worse off after the price floor is imposed? _____
- (F) Who gains from the price floor? _____

Pricing Problems

Write answers to the following questions. Be sure to support your answers with sound economic reasoning and draw graphs where appropriate to illustrate your answers.

1. “Gold is valuable because so many people hunt for it.” True, false or uncertain, and why?
2. A consumer group believes the prices of necessities such as food, housing, energy and medical care should be controlled by the government. “People can afford higher prices for luxuries,” they reason, “but all of us, and especially the poor, suffer when the prices of necessities rise.” Evaluate the effects of this plan.
3. State Representative Smith feels that New York can raise revenue 500 percent by increasing license-plate and registration fees by 500 percent. Will the government increase its revenue by 500 percent? Why or why not?
4. Make the assumption that one day you will be a college graduate. Would you support a law to raise the legal minimum wage of college graduates to \$50,000?

Activity written by John Morton, National Council on Economic Education, New York, N.Y.

5. Recently the price of beef rose. Use graphs to show that the increase in price could be consistent with the following. (Be sure to draw a graph and provide a brief explanation for each situation.)

(A) The quantity of beef consumed falls.

(B) The quantity of beef consumed rises.

(C) The quantity of beef consumed stays the same.

6. You stumble across a heated debate in the cafeteria. It seems that a bunch of friends just bought concert tickets from Ticketmaster, a ticket-handling agency, and paid a \$4.00 surcharge for each ticket. “It’s outrageous! It’s not like they actually do anything worth \$4.00,” complains a friend. Comment on her complaint.
7. You learn that a prominent economist is going to give a lecture, and you rush to get tickets. The economist says, “We economists don’t know much, but we know how to create shortages and surpluses.”
- (A) How can government create a shortage in a competitive market? Illustrate this with a graph. Can you provide examples of this?
- (B) How can government produce a surplus in a competitive market? Illustrate this with a graph. Can you provide examples of this?